ATOMIC ENERGY Letter

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Dear Sir:

The National Lead Company has now been selected as contract-operator of the USAEC's feed materials production center planned for construction near Cincinnati. This production center, to be located on a 1,200-acre site near the Miami river, 19 miles northwest of downtown Cincinnati, will include a uranium ore refinery and other facilities for the production of uranium in forms suitable for use at the Commission's fissionable materials production plants. Over thirty chemical and metallurgical firms were surveyed by the USAEC before National Lead was chosen as the contractor. The new facilities are being designed by the Catalytic Construction Co., with the George A. Fuller Co., as the construction contractor.

Observers of the atomic weapons tests at Eniwetok Atoll early this month have reported that the weapons tested showed destructive capacity in excess of any atomic weapons previously exploded by the United States or other nations. Full instrumentation of the target area has provided complete information on the blast effect (its physical impact), and on the ionizing radiation spread, as well as the performance of materials and structures under the conditions of the explosion. Improved radiation protective devices for human use were also utilized by the Armed Forces; some of the devices saw field use for the first time. Penetration of the contaminated areas, by radiation monitor teams of the Armed Forces, were some of the exercises, afforded by the explosion, which enabled plotting experience (of radiation intensities) to be gained by these monitoring teams.

Reflecting the increased interest of United States industrial firms in the national nuclear energy program (due, somewhat, to the increase in the number of such firms now contracting to the USAEC), 22 industrial firms will now send representatives to the Oak Ridge School of Reactor Technology, during the 1951-52 term beginning this September. This compares with only 4 industrial firms which sponsored attendance of representatives at the current 1950-51 term. (Attending the 1951-52 term will also be 8 students from government agencies, and 43 recent college graduates.) During the 12-month program, the trainees will be given specialized training in nuclear engineering, shown how fundamental engineering and management skills may be applied to problems encountered in such work, and will become acquainted with problems of the atomic energy program.

Under South Africa's program to recover uranium from the residue slimes of gold production plants there (and sell uranium to the U.S. & Britain), two additional mines there will now undertake the production of uranium: Stilfontein Gold Mining, and West Driefontein Gold Mining Co. Arrangements have been made by these companies with the Atomic Energy Board of South Africa, under which plants will be erected by these firms for uranium extraction. (The first firms to participate in this uranium extraction program were the West Rand Consolidated Mines; Daggafontein Mines; Blyvooruitzicht Gold and Western Reefs Exploration.)

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AT THE ATOMIC CITIES & CENTERS IN THE UNITED STATES...

ARCO, Idaho-Work on the nuclear reactors at the reactor testing station here has advanced to the stage where permanent operating people will soon be on the scene, W. C. Funk, assistant manager for the USAEC, Idaho Operations Office, has now stated. (The three reactors: experimental breeder reactor, materials testing reactor, and prototype ship propulsion reactor. Also in progress is the chemical processing plant, for nuclear "fuel" recovery.) Now, there are only about 600 permanent employees of the USAEC and its contractors here. From now on, however, "scientists, advanced engineers, technicians, and administrators" will appear on the scene. Funk estimated that by next Dec. 31st, there would be a total of about 1,600 permanent employees. In addition, the increased constructon tempo will add some 900 construction workers, making a total of about 3,200 by late Summer.

OAK RIDGE, Tennessee- The Southeast's first cyclotron is now in use here at the Oak Ridge National Laboratory, USAEC officials recently stated. Termed the largest fixed frequency proton cyclotron in the world, the 86-inch cyclotron was designed, fabricated and assembled in the electromagnetic plant (Y-12) area. It is the first cyclotron to be installed vertically, instead of horizontally. While two similar cyclotrons in the East operate at less than 10 Mev, this new Oak Ridge accelerator will operate at over 20 Mev.

"The Role of Engineering in Nuclear Energy Development" is to be the Summer Symposium which will be sponsored by the National Laboratory here and the Institute of Nuclear Studies. Open to all interested professional engineers, and others, sessions will be unclassified in nature, and will extend from August 27th to September 7th, with Labor Day a holiday. Subjects and speakers will include: Economic Aspects of Atomic Power, by Sam H. Schurr, co-author of the book of that name; Stable Isotope Separations, by Manson Benedict; Review of Reactor Types, by Neal F. Lansing; Hazards Associated With Low Power Research Reactors, by M. M. Mills; The Materials of Reactor Construction, by G. E. Evans, etc. The complete program and further information on this symposium may be obtained from the University Relations Division, Oak Ridge Institute of Nuclear Studies, P. O. Box 117, Oak Ridge, Tenn.

Bids have now been asked by the USAEC for the construction of the chemical isolation and purification laboratory at the X-10 area here. Bids for the work will be received until June 15th; plans and specifications may be obtained from the USAEC here at Oak Ridge.

ATOMIC PATENT DIGEST...latest U. S. applications & grants...

Pulsing circuit. Comprises a signal generator for generating high-frequency wave energy. U. S. Pat. No. 2,550,878, issued May 1, 1951; assigned to United States of America (USAEC).

Methods for locating deposits. A method of geochemical and geophysical prospecting for subterranean deposits. Steps comprise: (1) procurring samples from the earth at different points in a predetermined region, (2) detecting in each sample the presence of at least one selected element indicative of the hidden deposit, (3) measuring in each sample the relative abundance of the isotope of said selected element, (4) recording these measurements to determine significant anomalies indicative of the hidden deposits, U. S. Pat. No. 2,551,449, issued May 1, 1951 to John R. Menke, N.Y., assignor to Nuclear Development Associates, N.Y.

Safety container for operations with radioactive substances. Comprises a body containing a block of material which is relatively impervious to the emanations from radioactive material, with various openings, plugs, handles, etc. U. S. Pat. No. 2,551,491, issued May 1, 1951, to Ernest Norman Gilks, Harborne, Birmingham, England.

Pulse amplitude discriminator. Comprises an input circuit for receiving pulses variable in amplitude characteristics, with associated circuit. U. S. Pat. No. 2,551,529, issued May 1, 1951; assigned to United States of America (USAEC).

Mass spectrometer. Comprises an evacuated tube with an ion source at one end, means for accelerating and forming ions from said ion source and separating them in accordance with their different mass-to-charge ratios. U. S. Pat. No. 2,551,544, issued May 1, 1951; assigned to United States of America (USAEC).

RADIOISOTOPES...applications and investigations...

The recent meeting of the Federation of American Societies for Experimental Biology, held in Cleveland, heard of work by H. Green, and H. S. Anker, University of Chicago, on antibodies and serum globulins, using isotope tracers. They injected a labeled amino acid into a rabbit and after allowing time for incorporation in body protein, followed with an injection of egg albumin antigen. They reported that the isotope concentration in the antibodies exceeded that of the free amino acid during the period over which the antibody was synthesized. This indicated, Dr. Green said, that the synthesis occurred, at least in part, from sources other than free amino acids. He said that the isotope concentration from the various serum protein fractions was sufficiently high so that these could serve as precursors of the antibody.

The meeting also heard of a study by a group at Tulane University School of Medicine, using radioactive phosphorous (P-32), in an investigation of human serum lipoproteins. W. H. Goldwater, of Tulane, told the group that the P-32 was administered to patients to label the phospholipid component of human blood.

Nitrogen-15 was used to follow the course of the synthesis of niacin in Neurospora, C. W. H. Partridge, and D. M. Bonner, Yale University, told the meeting. It was found, they reported, that niacin is synthesized from anthranilic acid via indole and tryptophan.

NOTES- A survey of radioisotope users in Massachusetts, a joint project of the Massachusetts Departments of Public Health and Labor and Industries, has now covered industrial laboratories, academic institutions, hospitals and other locations where isotopes are used. A questionnaire-type survey, topics covered were personnel, laboratory design, equipment, waste disposal, instrumentation, and hazard monitoring. An analysis of the returned questionnaires showed that there is no generally accepted policy on medical check-ups and treatment for over-exposure. Many different laboratory designs were shown to be in use, with varied equipment. While in most installations there were beta-gamma survey monitoring devices, only large organizations that maintained health-hpysics and monitoring groups had adequate personnel protection techniques. Some existing practices of disposing of radioactive wastes were found dangerous; carelessness or indifference due to lack of training was found at small installations which lacked safety experts. The Departments have made such recommendations as: physical examinations before employment and blood counts at 3-month intervals thereafter; a definite policy to prevent ingestion of harmful materials, or exposure to them; indoctrination of personnel in dangers extent; health physics or monitoring groups to serve all installations that need such services.

NEW BOOKS & OTHER PUBLICATIONS...in the nuclear energy field...

Atomic Energy in War and Peace, by Burr W. Leyson. Some semi-technical aspects of the atomic and hydrogen bomb; implications of atomic energy. 217 pages. -E. P. Dutton & Co., New York ($3.75)

International Bibliography on Atomic Energy: Vol. 2, Scientific aspects. A compilation by the atomic energy commission group, United Nations.--Columbia University Press, New York. ($10.00)

Atomic Energy: A Symposium-Applied Research., by R. E. Wilson and S. T. Pike. A short pamphlet covering the subject in a sketchy manner. 22 pages. (Economic policy division series No. 37.)--National Assoc. of Manufacturers, New York 20. (n/c)

Bulletin of the Geological Survey of Gt. Britain; No. 3. A record of some of the work of the atomic energy division of the Survey. Covers researches on radioactive ores. Of especial interest is one paper which is the first technical description of the uranium ores of the Rand goldfields, recently the subject of an agreement between the British, United States, and S. African governments. 71 pages. --H. M. Stationery Office, London. (75¢) (4s 8d)

This is Civil Defense. Basic information to the public on the U. S. civil defense program.--Federal Civil Defense Administration, Washington 25, D. C.

IONIZING RADIATION...investigations & notes...

INDUSTRIAL- Radium, X-ray, and fluoroscopic equipment were being handled under unsafe working conditions, in every one of 12 hospitals recently surveyed, William LaRocque, Liberty Mutual Insurance Co., recently told the annual meeting of the American Industrial Hygiene Association, in Atlantic City. Physicians were found handling radium sources with virtually no protection whatever, it was found. Radium was being stored (between uses) in everything from water glasses to tin cans. Because of its value, the radium was often stored in office safes which afforded little resistance to the radiation. LaRocque found that some dental X-ray equipment irradiated the operator to a maximum permissible dose after as few as five exposures had been made. Many fluoroscopes and diagnostic X-ray apparatus were inadequately shielded or were used in a dangerous manner.

Disposal of radioactive wastes was outlined to this meeting (above), by R. C. Corey, Bureau of Mines. He suggested, for research and medical laboratories which do not have facilities for disposing of radioactive wastes, the use of the techniques of the Bureau. (The Bureau does work for the USAEC under a contract.) Corey recommended that when such waste is incinerated, the ashes be collected in a steel vessel containing molten sodium hydroxide at 1000-deg. C. The flux will dissolve all of the ash constituents. After this flux has solidified, the vessel containing it can be properly shielded and shipped to a facility that has disposal vaults. This procedure, Corey stated, does not require handling of dry ash, or using wet collection methods, and allows the ash to be removed to the final disposal point in a compact, convenient form. The particular flux was chosen because it will not react to form explosive products with the ash, is relatively inert to the container at the operating temperatures, and has a low vapor pressure and a melting point within a convenient range.

BIOLOGICAL- Inactivation of enzymes by soft X-rays was recently described to the Washington (D.C.) meeting of the American Physical Society, by W. R. Guild, Yale University. The enzymes tested could be inactivated in a relatively short time-on the order of 30 minutes for 37% survival-Guild stated, because of the high radiation delivered to the thin film of protein. Thus far, he said, catalase, urease, and chymotrypsin have been inactivated, with urease having the largest cross-section, and chymotrypsin the smallest.

M. Slater, Yale University, told the Society (above) that equipment was constructed to enable a 0.1 -microampere beam of 1.5 Mev, from the University's linear electron accelerator, to be used for the bombardment of viruses and enzymes previously studied by deuteron, ultraviolet, X-ray and heat inactivation.

The combined thermal and primary ionization effects on a bacterial virus was the subject of a paper before the Society by W. R. Adams and Ernest Pollard, Yale University. They stated that since primary ionization causes a sharp localized rise in temperature, it is possible that at least part of the biological action of primary ionization is caused by local thermal action. The effect of the heat, they stated, is to lower the energy requirement for radiation action, and thus to increase the radius of action of ionization under thermally altered conditions.

Growth processes in living tissue, and their interruption by physical means, were described before the annual meeting of the American Societies for Experimental Biology, in Cleveland, by C. A. Tobias, University of California. In discussing the 184-inch Berkeley cyclotron, Dr. Tobias pointed out that the high energy beam of the cyclotron permits a selective radiation unattainable with most other instruments. Radiation ordinarily lethal when given to the whole body of the animal is not necessarily lethal if part of the body is protected. Dr. Tobias showed the effect on growth of rats whose putuitary glands had been selectively radiated. The growth retardation corresponded to that observed on rats whose pitutary gland had been altered surgically. Furthermore, Dr. Tobias explained, by means of such selective radiation of the rat pituitary, the production of hormones could be altered to a degree not reached by surgery.

NEW PRODUCTS, PROCESSES & INSTRUMENTS...for nuclear work...

FROM THE MANUFACTURERS- Nucleometer, scintillator type, for alpha, beta, and gamma radiation; RCL Mark 9. Consists of a scintillator head, containing a plastic enclosed crystal (anthracene or stilbene), a 5819 photo-multiplier tube, and a cathode follower. Following the scintillator head is a linear amplifier and scale of 512 section. Sensitivity of this Nucleometer is said by manufacturer to be approximately 25 times as great (so far as I-131 gamma radiation is concerned) than the conventional mica window counter, geometries being similar.--Radiation Counter Laboratories, Inc., Chicago 8, Ill.

Specially printed pressure-sensitive tape, with the radioactivity symbol and the word "Radioactivity" printed in magenta on a yellow background. Available in one-inch rolls, 215-feet long. --Nuclear Instrument & Chemical Corp., Chicago 10, Ill.

PRODUCT DEVELOPMENT- A compact film badge has been developed by the National Bureau of Standards for industrial safety programs and for monitoring in civil defense. The development resulted from investigations of X-ray effects on photographic film emulsions. The studies involved the effects of high-energy X-rays--ranging from those produced by constant exciting potentials of 50 KV to the radiation from a 10 Mev betatron--and included a determination of the sensitivity and energy dependence of the photographic emulsions. This NBS film badge--for radiation intensities from 0.5 to 10,000 roentgens -- uses an absorber made of 1.07 mm of tin and 0.5 mm of lead placed over a bakelite container 8.25 mm thick. Before the NBS film badge could be constructed, two major problems had to be solved. The first was to select film emulsions which would detect dosages within the required range. The second was to devise means which would make the response of the emulsions independent of the extraneous electron flux and of the radiation energy. Sixteen film emulsions were tested, and of this group, four were selected which offered the lowest possible inaccuracies within the dosage range from 0.5 to 10,000 roentgens. The films were all exposed to X-rays with an effective potential of approximately 600 kev. Dupont films 510 and 605, and Eastman 5302 and double-coated 548-0 were chosen as most suitable in the dosage range of greatest biological interest. In the course of the investigation, absorbers of different materials and thicknesses were exposed to radiation energies of varying potentials. In the final analysis of the resulting data, the tin and lead absorber thicknesses used in the NBS film badge were found to represent the best compromise for all possible variations in radiation energy and film type. The film badges were calibrated with X-radiation energies from 115 Kev to 10 Mev. The accuracy limits within the ranges from 1 to 50 roentgens and from 500 to 10,000 roentgens are plus or minus 12%. In the center range, from 50 to 500 roentgens, the resulting limits are plus or minus 20%.

A radiation detection instrument, reading from 0.005 to 500 roentgens per hour, has been developed by Anton Electronic Laboratories, Brooklyn, N.Y., for the Navy's Bureau of Ships, and Naval Research Labortory. The device is housed in a waterproof case; its total weight is two-pounds.

NOTES- The application of radioactive tracers to diffusional operations, discussed by H. E. Hughes and J. O. Maloney, University of Kansas, before the meeting of the American Institute of Chemical Engineers, in Kansas City last week, described a static and flow counter developed for the assay of volatile liquid samples containing compounds of C-14. The analytical technique devised was used to obtain vapor-liquid equilibrium data for the systems mathanol-water and methanol-ethanol-water, and liquid equilibrium data for the system n-butanol-methanol-water. Some of the advantages and limitations of tracer methods discovered through these studies were presented. Also discussed was radioactive methanol which has been successfully employed in the analysis of the distillation of both binary and ternary mixtures.

Sincerely,

The Staff,
ATOMIC ENERGY NEWSLETTER